DOI: 10.61782/fa.2025.0911

FORUM ACUSTICUM EURONOISE 2025

TOWARDS THE WORLDS LARGEST NOISE COMPLAINT DATABASE

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ABSTRACT

Silencio is a community-driven platform tackling the escalating issue of noise pollution across the world. Through its free application, Silencio aims to become the world's largest citizen science initiative dedicated to combating noise pollution. Users contribute hyper-local noise data and are incentivized with 'noise coins', redeemable for goods, services, and environmental initiatives within the platform. As of April 2025, Silencio has collected 35 billion data points from over 1 million sensors across 180 countries. A key feature allows users to log noise complaints, transforming crowd-sourced data into actionable insights for governments and urban planners. This paper explores the noise complaints dataset, analysing patterns in timing, location, and the types of noise most likely to prompt complaints. We believe this represents the world's largest noise complaint database.

Keywords: Noise**,** complaints, citizen science.

1. INTRODUCTION

Silencio is a community-driven platform tackling urban noise pollution through a free smartphone application (app) that aspires to be the largest citizen science project in the world [1]. By leveraging blockchain technology, it enables users worldwide to contribute real-time noise data by transforming their smartphones into anonymous noise monitoring devices that record decibel levels, creating a detailed global noise map. Users are incentivized through 'noise coins' which can be redeemed for goods, services, and environmental initiatives within the platform, allowing them to generate passive income while improving urban living conditions. By utilizing blockchain technology, the system enables users to maintain full control over their data and receive equitable compensation for their contributions. The economic model incorporates a revenue-sharing mechanism, whereby a substantial fraction of commercialization proceeds are returned to the data-generating community, aiming to establish a sustainable and equitable web3 data economy.

With an innovative tokenomics model, Silencio fosters a sustainable and engaging ecosystem where participants actively combat noise pollution while benefiting from their contributions. By collecting accurate, real-time data, the platform empowers governments, city planners, and industries to make informed decisions, leading to more effective noise control strategies and enhanced quality of life for urban residents.

As of April 2025, there are over 1 million devices on the Silencio Network, across 180 countries. In the month of February 2025 alone, there were 600,000 hours measured across 51.9 million measurement uploads, 400,0000 check-ins and 125,000 new users. Since its inception in 2023, Silencio has become the largest decentralized noise intelligence network in the world.

1.1 Silencio App

1.1.1 Street Level Explorer

Silencio uses a data pipeline to continuously stream information from their database for user interaction. This

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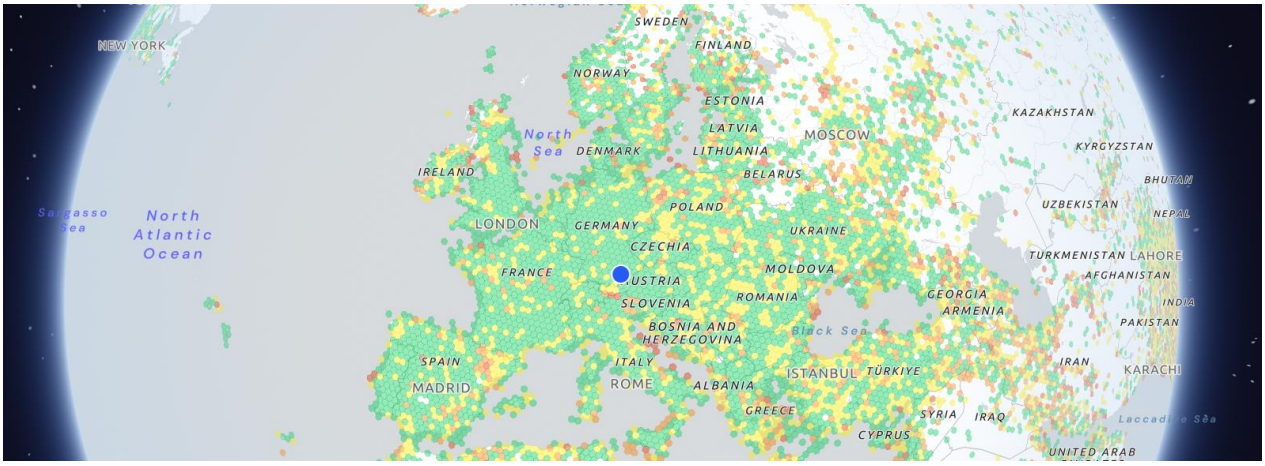

Figure 1. The Silencio Steet Level Explorer

pipeline systematically processes hexagons at multiple resolutions, ranging from 3 - 13, depending on geographic location. It then recalculates and updates the average noise levels in each hexagon. Overall results are displayed on a map that users can explore from a broad overview (Figure 1) to the street level (for examples a street level map for the city of Malaga is displayed in Figure 2). These maps are developed from real noise measurement data, uploaded by users of the Silencio App.

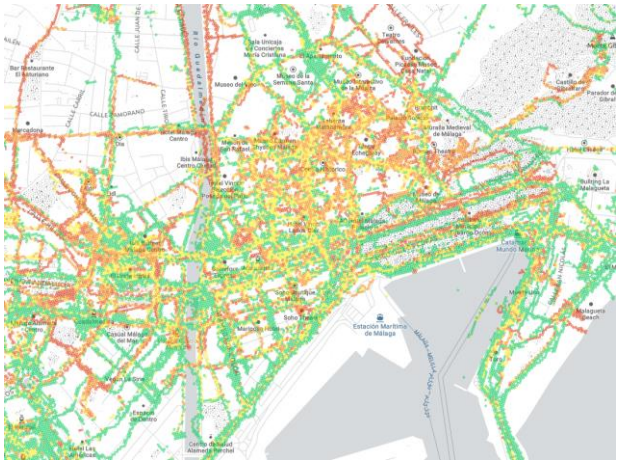

Figure 2. Results from Malaga, Spain

1.1.2 Venue Check in Explorer

Silencio also lets users check in at venues and measure and report noise levels in real-time using their mobile devices. The app verifies the user's location to ensure noise levels are accurately associated with the corresponding venue. The app first records a 15 second noise measurement. After that, users answer a series of questions about their environment, such as whether they are indoors or outdoors, how easy it is to have a conversation, and how crowded the venue is. These measurements are then aggregated and displayed on a map for easy visualization. Users can view the number of check-ins and the average noise level at each venue, all of which are displayed on the map for easy reference.

1.1.3 Noise Complaints

The app also allows users to log noise complaints when they encounter excessive noise in their area. Complaints can be reported at any location or venue, making it easy for users to highlight problematic areas. Each complaint is recorded and displayed on the map, with clusters indicating areas with higher noise levels based on the zoom level. This visual representation helps users and city officials quickly identify noise hotspots. By collecting and analyzing this data, cities can gain valuable insights into noise pollution trends, enabling them to implement better urban planning strategies and public health initiatives to create quieter, more livable spaces.

1.1.4 Noise Coins

Silencio harnesses blockchain technology to build a global community of users contributing to a real-time noise map. By turning their smartphones into anonymous noise monitoring devices, users help collect decibel measurements, creating a detailed worldwide picture of noise levels. In return for their contributions, users can earn passive income while also helping to improve urban soundscapes. With an innovative tokenomics model, Silencio fosters a sustainable and engaging ecosystem where participants are rewarded for their efforts in reducing noise pollution and enhancing overall quality of life.

Central to the Silencio ecosystem is the $SLC token, powered by the Blocksound Foundation, which is used for rewarding contributors, transactions, staking, and governance across the network. The network allows contributors to earn $SLC tokens as a reward for their data contributions, ensuring that every user is a stakeholder in the network's success.

2. NOISE COMPLAINT DATABASE

For this paper we focus on the noise complaint database acquired through the Silencio App. As of March 2025, Silencio users have logged over 150,000 noise complaints all across the world. Complaints are logged for over 180 countries.

Table 1 presents the top 10 countries by noise complaint logged on the Silencio App.

Table 1. Top 10 countries by noise complaint logged.

Country	Number of Complaints
Nigeria	50,400
Philippines	16,509
India	10,553
Bangladesh	9,994
Indonesia	9,759
Pakistan	7,028
United States	6,362
Brazil	3,922
Turkey	2,421
Vietnam	1,922

Figure 3 presents the geographical spread of noise complaints over Europe, while Figure 4 presents results from Nigeria.

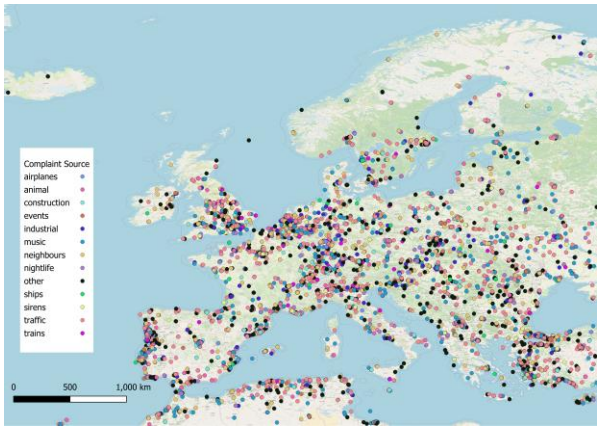

Figure 3. Noise complaints from the European Region.

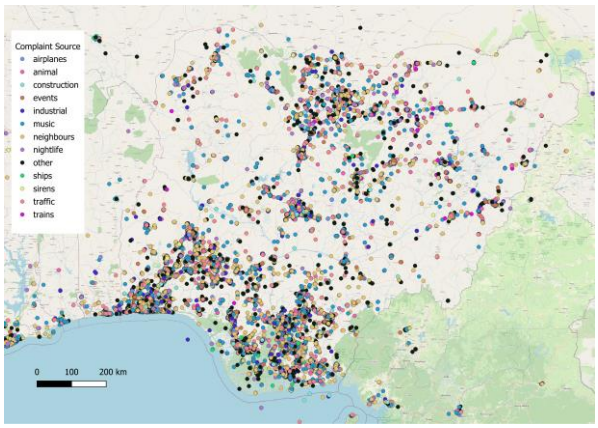

Figure 4. Noise complaints from Nigeria

2.1 Results Analysis

Figure 5 presents the source of noise by category logged. It is evident that road traffic noise is the number one source of noise complaints logged, contributing to over 35,000 noise complaints.

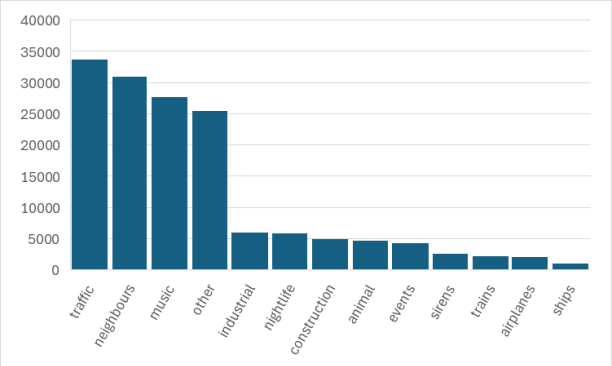

Figure 5. Number of complaints by source type.

Users are also asked to describe how the noise affecting them is impacting their well-being. They can choose from various options, including "uncomfortable," "annoyed," "disruption of relaxation," "anxious," "difficulty sleeping," "increased stress," or "angry." The results, shown in Figure 5, reveal that the most common response fell under the "other" category, suggesting a range of additional disturbances not explicitly listed. The second most frequently reported impact was feeling "uncomfortable," followed closely by "annoyed."

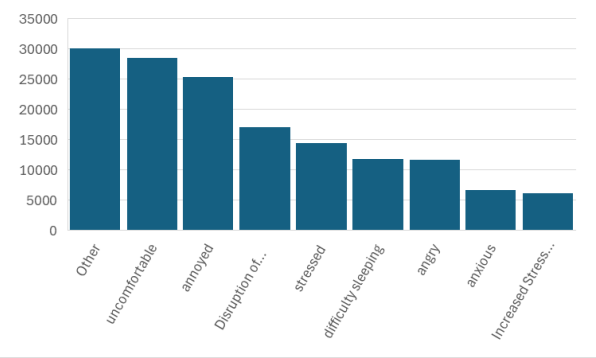

Figure 5. Number of complaints by effect induced.

3. DISCUSION

The Silencio noise complaint database builds on previous research [2-4] that explored the use of smartphones as noise meters, offering valuable insights into global noise pollution and its effects. With over 150,000 complaints across 180 countries, the data highlights the widespread nature of noise disturbances and the need for targeted mitigation strategies.

A key finding is the concentration of complaints in specific regions, with Nigeria reporting the highest number. The dominance of road traffic noise aligns with global urban trends, emphasizing the impact of transportation infrastructure on acoustic environments. Beyond identifying noise sources, the reported effects, such as discomfort, annoyance, difficulty sleeping, and increased stress, underscore the serious implications of noise pollution on well-being and public health.

Silencio's blockchain-based model enables large-scale, community-driven data collection, providing valuable insights for urban planners, policymakers, and researchers.

As this database continues to grow, its potential to drive meaningful changes becomes even greater. By refining data collection methods and integrating advanced analytics, we can uncover deeper patterns in noise pollution and its long-term effects on public health. Future efforts could involve collaborations with city governments, environmental agencies, and urban developers to create smarter noise management policies and real-time response systems. Additionally, integrating Silencio's data with other environmental datasets, such as air quality and traffic patterns, could provide a more holistic view of urban livability. For example, previous research has considered combining air and noise into one index to assist with urban planning [5]. Ultimately, this expanding database has the potential to become a powerful tool for shaping quieter, healthier, and more sustainable cities worldwide.

4. ACKNOWLEDGMENTS

The authors gratefully acknowledge the Silencio team for sharing noise complaint data.

5. REFERENCES

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